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The Transportation Network in Southern Africa [redacted] 25X1

A Research Paper

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The Transportation Network in Southern Africa

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A Research Paper

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This research paper is based on a study

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March 1985

The Transportation Network in Southern Africa

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Key Judgments

Information available as of 12 February 1985 was used in this report.

The transportation network in southern Africa could function as a single system with rail lines, roads, and ports integrally linked. In practice, however, key transport corridors to the east and west coasts are disrupted by insurgency or are otherwise unreliable, preventing the network from operating as an integrated whole. As a result, much of the region's trade moves along the "Southern Route" of north-south rail lines running from the Zairian Copper Belt to South African ports.

The transportation dependence of the black states of the region also includes their use of South African equipment. South African freight cars are used in nearly all of the black states, as are South African locomotives in several states. An equipment recall by Pretoria would, in our view, strangle the economies of the landlocked states.

We believe that Pretoria's transportation dominance reflects both natural advantages and deliberate policy. South Africa has seven of the 14 major ports in the region, and they, and the rail and road lines that serve them, are more developed and better run than any of the others. In our view, Pretoria allows other states to use its transportation system and to lease its equipment for several purposes: to earn foreign exchange, to perpetuate black African dependence, and to enhance its ability to use transportation leverage for broader political and military purposes.

Nine of the black states in the region [1] formed the Southern African Development Coordination Conference (SADCC) in 1980 to overcome this stranglehold by Pretoria and to promote their economic development. The SADCC plans no major new links because much of the region already has excess transportation capacity. Instead, the group aims to reopen lines that could divert traffic from the "Southern Route" through South Africa and to rehabilitate and upgrade the existing transportation infrastructure.

In our view, the short-term prospects for implementing this strategy are gloomy. The insurgencies in Mozambique and Angola would have to end, and massive investment in equipment and training of personnel would be required. The SADCC has had difficulty raising transportation development funds, and the transportation systems of several of the member states—particularly the coastal ones—have deteriorated further since initial cost estimates were made.

[1] Angola, Botswana, Lesotho, Malawi, Mozambique, Swaziland, Tanzania, Zambia, and Zimbabwe.

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We believe that the longer term prospects for the SADCC's transportation independence are also poor. While it might be possible for the black states eventually to develop a transportation system independent of South Africa, we doubt that the SADCC will ever do so because most of the black states would be unwilling to forgo the economic benefits of trading with South Africa.

Even if the insurgencies in Mozambique and Angola end, which would open vital east-west routes, we believe that South Africa would still maintain considerable leverage over the transport and more general economic options available to the black states. Although their economic vulnerability would decline, we believe some measure of dependence would continue, as now, in inverse proportion to their distance from South Africa.

In our judgment, the virtual stranglehold that Pretoria has over the transportation network in southern Africa limits both the choices available to the black states and US policy options for promoting peaceful change and stability. Even so, we believe that US support for SADCC transportation projects—such as rehabilitating neglected national rail, road, and harbor facilities as well as links between SADCC member states—would not only contribute directly to the black states' development but also, ironically, indirectly foster increased SADCC trade with South Africa. This, in turn, would create greater economic interdependence between Pretoria and the black states, possibly reducing hostility in the region.

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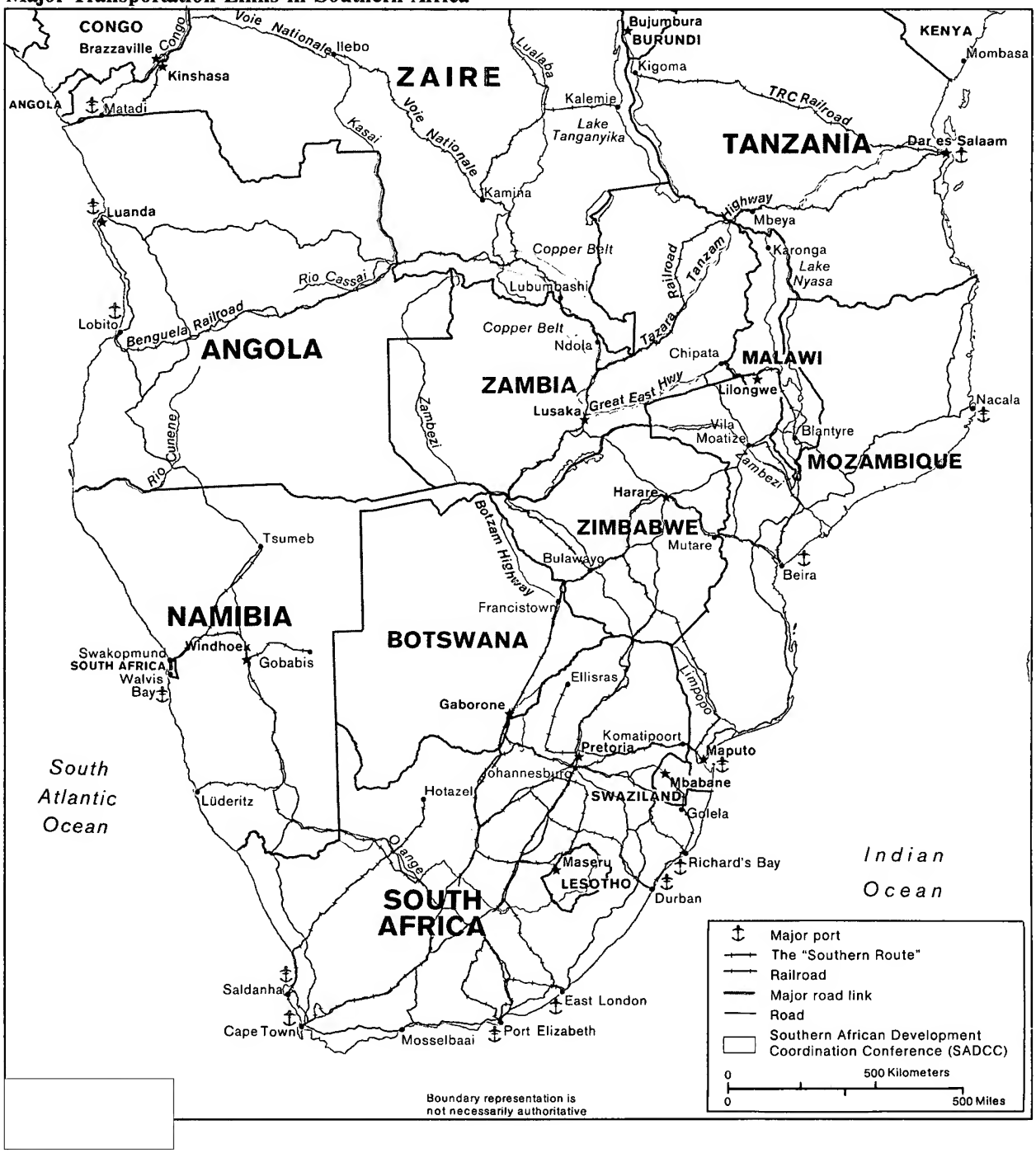
Figure 1
Major Transportation Links in Southern Africa



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The Transportation Network in Southern Africa

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Introduction

The transportation network in southern Africa potentially could function as a single, integrated system extending from the Zairian port of Matadi on the west coast and the Tanzanian port of Dar es Salaam on the east coast to the ports of South Africa (figure 1). The linchpin of a unified regional transport system interlinking roads, ports, and other components would be the rail lines. Because these lines are almost all the same gauge, rolling stock would be interchangeable so that any rail line that is short of locomotives or freight cars could lease the needed equipment from neighboring lines. In theory, therefore, a variety of routing options would be possible, with Angolan, Mozambican, and Tanzanian ports handling traffic for several countries.

In practice, of course, this has not occurred. On the east coast, the Mozambican ports of Nacala and Beira usually are isolated by insurgent activity, and the rail line from Zimbabwe to Maputo is essentially closed for the same reason. On the west coast, the Benguela railroad is disrupted and the Angolan port of Lobito inaccessible because of insurgency. Transportation lines to Matadi and Dar es Salaam are inefficient and unreliable because they lack the necessary equipment and skilled personnel to handle traffic effectively and safely. As a result, much of the region's trade moves along the "Southern Route" of rail lines running from the Zairian Copper Belt to South African ports.

This paper examines the transportation network of southern Africa in terms of its major functional components and the facilities in each state. It assesses the extent to which the network constitutes an integrated system, the degree to which that system is dependent on South Africa, the feasibility of the goal of the black states to develop a system independent of South Africa, prospects for change and for future problems, and the implications for the United States.

Major Components of the Network

The surface transportation network in southern Africa consists of five major components: railroads, highways, coastal ports, inland waterways, and pipelines. For each category, the efficiency, reliability, and level of development is higher in South Africa than in any of the black-ruled states.

Railroads

The railroads are the transportation lifelines of the region, but all of the region's railroads outside of South Africa face serious problems, including:

- Impassable routes because of insurgency.
- Track in disrepair because of either war, poor maintenance, or poor design.
- Short trains—often less than 30 cars in length—necessitated by poor track design, including steep grades and short turning radii.
- Lack of skilled labor.
- Lack of spare parts.
- Poor communications and signaling.
- Freight car shortages, particularly for handling petroleum, chemicals, containers, and refrigerated cargo.
- Lack of working locomotives.
- Theft.

These problems tend to increase the dependence of the black states on South Africa. Although the "Southern Route" is usually more expensive than potential alternatives, it is often the only one that functions. Even when alternatives exist, the "Southern Route" is more reliable and efficient, a critical consideration for imports such as fertilizer that must be delivered at specific times. In addition, South African freight cars are used extensively throughout the region, and locomotives have been leased by various black states from the South African Transport Services (SATS), a state-run enterprise.

Several states face serious backhaul problems because they tend to import more than they export and because they use one port for exports and another for imports. Zambia, for example, prefers to export most of its copper through Dar es Salaam. The freight cars that carry Zambian copper often return to the Copper Belt empty, however, because Lusaka prefers to get most of its vital imports either from or through South Africa. Lusaka views Dar es Salaam as too unreliable to handle imports that must be purchased with precious foreign exchange. As a result, Zambia must export about 10,000 metric tons of copper per month via the "Southern Route" to limit the cost of sending empty freight cars to South Africa, even though shorter alternative routes exist.

The South African railway system suffers from few of the ills of its neighbors: it is highly efficient, the track is well maintained, and there are few if any shortages of freight cars, locomotives, or spare parts. The South Africans continue to upgrade their system with extensive electrification, double tracking, siding extension, and the move to air brakes, which allows for trains of up to 200 cars in length.

Highways

Roads supplement the rail system throughout the region and are used primarily for transporting agricultural products and local commerce, although the Tanzam Highway and to a lesser degree the Botzam Highway are major carriers of international traffic. Zambia's Great East Road from Lusaka to Chipata has become an important carrier of Malawian imports and exports because of the effective closure of Beira and Nacala.

Maintenance of roads varies from state to state. Most major roads in Zambia and Zimbabwe are passable in all seasons, for example, and speeds in excess of 100 kilometers (over 60 miles) per hour are easily attainable. In Tanzania, on the other hand, all major roads, except the Tanzam Highway, are so poorly maintained that they are nearly impassable even in the dry season from June to August.

In addition to poor maintenance, highway traffic is hindered by roads often stressed beyond design standards by overloaded trucks in violation of seldom enforced weight limits. Consequently, vehicles and roads are subjected to excessive wear and tear. Spare parts, particularly tires, are difficult to obtain, and fuel is expensive when available.

Nonetheless, road transport is growing in use, often at the expense of railroads. Road transport allows more flexibility in scheduling and route choice and in some states, such as Malawi and Mozambique, is more reliable. In most states, road transport operates with little government interference, whereas the railways often operate for political as well as economic reasons. Rail officials in South Africa, Zambia, and Zimbabwe are seeking regulation of road haulers to reduce their loss of traffic.

South Africa's road system is far better than the highways in the black-ruled states. Limited-access highways are common in the Transvaal and around major urban centers in other areas. This contrasts sharply with the rest of the region, where a major road consists of two lanes and must be shared by all: motor vehicles, bicycles, animal-drawn carts, pedestrians, and livestock.

Coastal Ports

The ports of southern Africa are shallow by world standards (except Richards Bay) and few in number, considering the size of the region. The average maximum channel depth of 10 to 12 meters severely limits the size of ships that can use them. In the United States, for example, 50,000-ton grain ships are common, while the largest grain ships that even South Africa's well-run ports can handle are less than 30,000 tons in capacity. Other limitations include siltation, particularly at Beira, Mozambique, and the west coast's lack of breakwaters and natural barriers to protect harbors from high winds and waves.

The ports of the black-ruled states suffer from a lack of modern equipment and skilled labor, poor maintenance, the deterioration of physical infrastructure, poor management, inadequate storage, and theft. They have had particular difficulty keeping pace with

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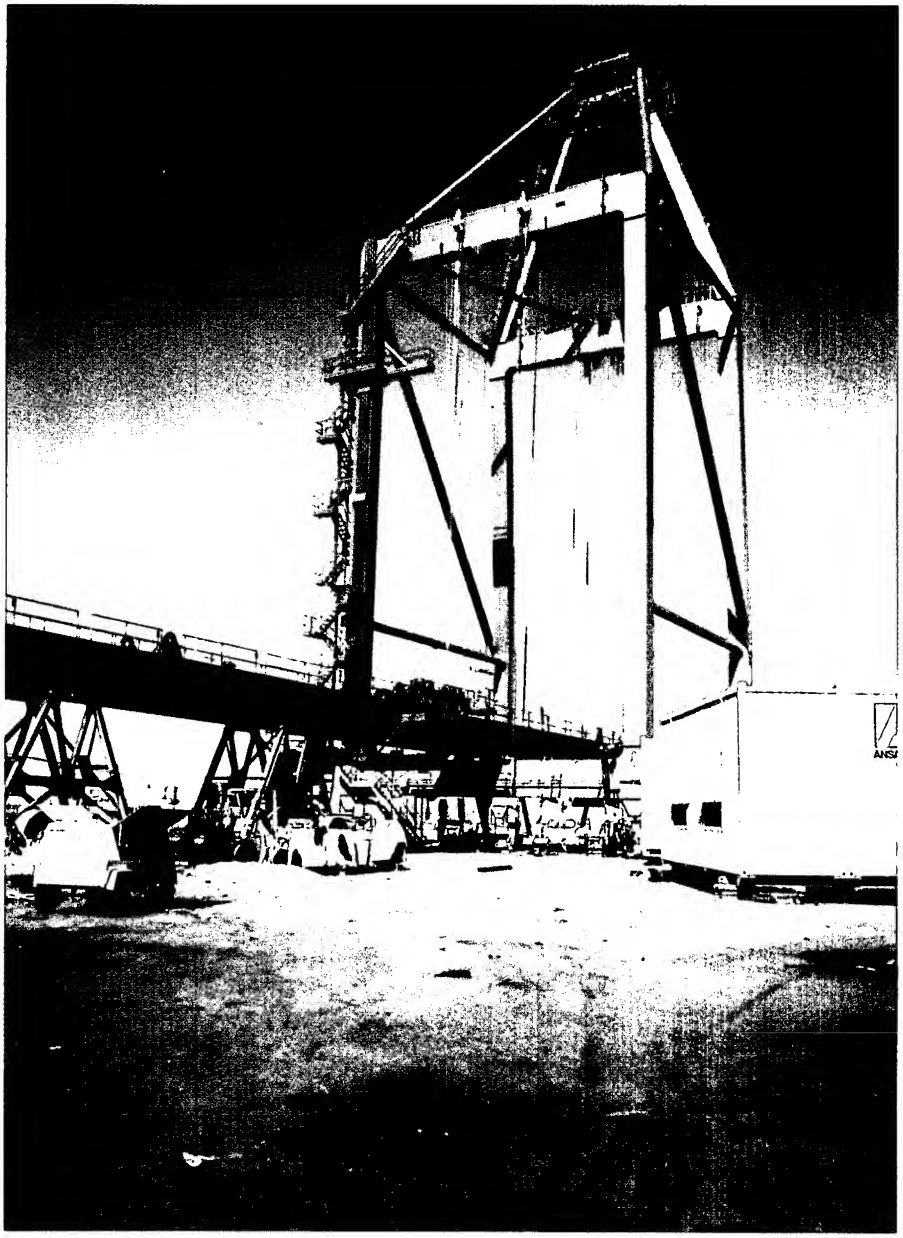
Figure 2. Crane construction for containers at Maputo.



the boom in container traffic and are only now beginning to commission equipment, to restructure storage areas, and to learn management practices for the efficient handling of containers (figure 2).

By contrast, South African ports have adapted quickly to containerization, and their entire infrastructure surpasses that found at ports in the black states. The efficient management of port operations ensures that ships are loaded and unloaded rapidly and keeps theft at a relatively low level (figure 3). South Africa also benefits from its location and the fact that it has seven major ports—more than any other state in Africa.

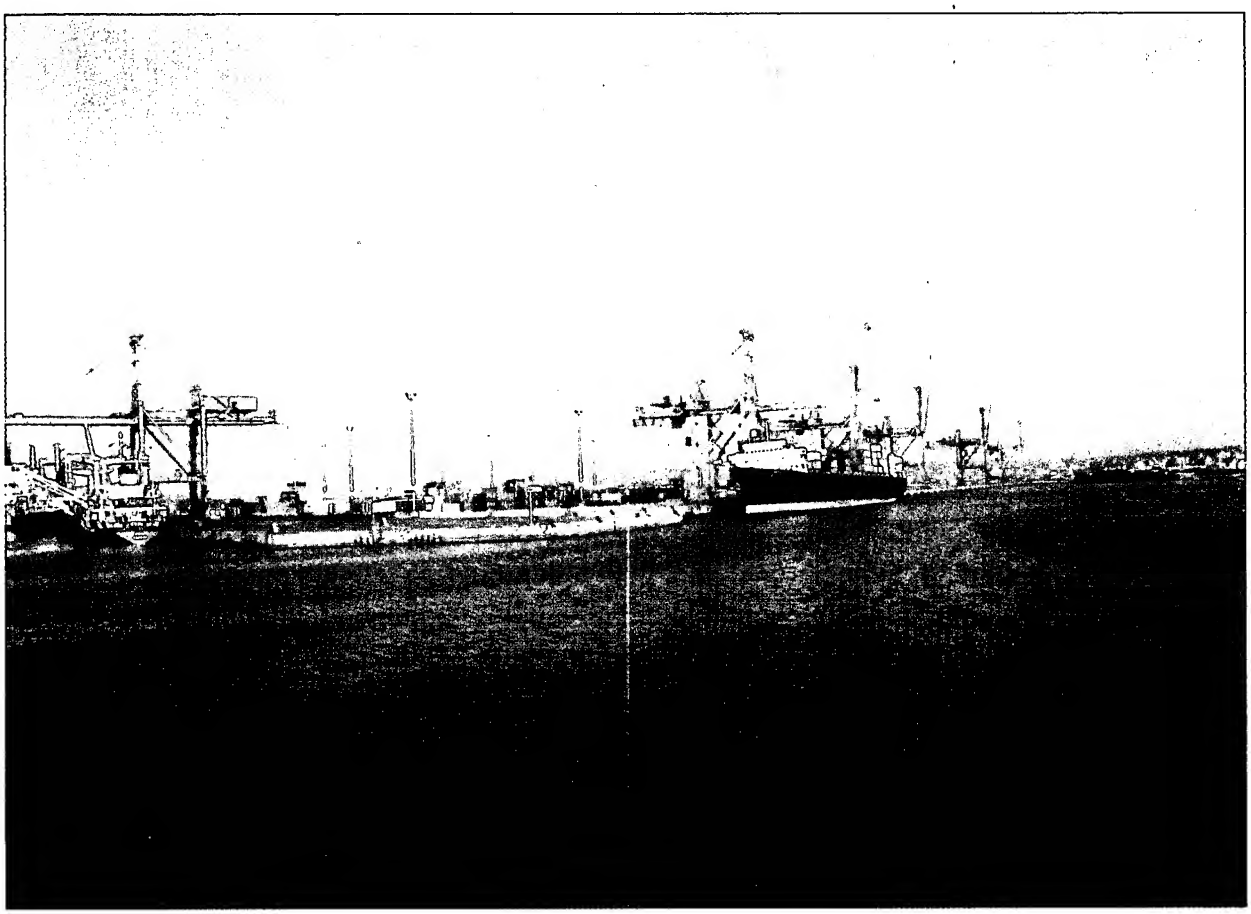


Figure 3. Container area at Durban.

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Inland Waterways

River traffic in the region is limited because most rivers are not navigable for any significant distance. The major exceptions are the Zaire and Kasai Rivers, which form part of the Voie Nationale, a rail-river-rail route that runs from the Zairian Copper Belt to the coastal port of Matadi.

The tonnages carried on the lakes in the region are small when compared with rail and road movements. Lake Tanganyika links Tanzania with Zaire and Burundi, and Lake Nyasa handles Malawian traffic and a very small amount of Tanzanian traffic. Malawi's northern lake port of Karonga on Lake Nyasa is now linked by road to the rail-road-pipeline corridor running from Dar es Salaam to Zambia, which could lead to a significant increase in Malawi's use of the lake.

Pipelines

Three of the four major pipelines in the region that carry crude oil are in South Africa; the other serves Zambia from Dar es Salaam. A fifth pipeline from Beira in Mozambique to the Zimbabwean town of Mutare carries refined petroleum because the refinery at Mutare is no longer operational.

The pipeline across Mozambique has been subject to periodic disruption. In October 1981, an explosion destroyed portions of a bridge northwest of Beira that supports the pipeline. The sabotage delayed reopening the pipeline, which had been closed since 1965 because of the Rhodesian Civil War, until June 1982, according to press reports. In addition, the destruction of many of the oil storage tanks at Beira in December

1982 disrupted the pipeline for at least another month. In our view, South African interests have been served by attacks on the pipeline that made Zimbabwe at least temporarily dependent on the "Southern Route" for its oil supplies.

The Role of Each State

South Africa

The South Africans view transportation as an aspect of foreign policy, labeling it "Transportation Diplomacy" (figure 4). South African eagerness to lease its rolling stock to neighboring black states and to have them use South African rail lines and ports reflects, in our view, Pretoria's interest in increasing regional trade, perpetuating the dependence of the black states, and encouraging them to give at least unofficial recognition to the white regime.

We believe the South Africans use transportation leverage as both a carrot and a stick in their relations with their black neighbors. Cooperation with South Africa has led to the development of new transportation infrastructures in Mozambique, Botswana, Malawi, and Swaziland and has alleviated equipment shortages in several states, including Zambia. On the other hand, Pretoria has subjected several states to transportation blackmail—for example, Zimbabwe in 1981, when Pretoria sought to compel Harare to establish normal diplomatic relations by the recall of South African locomotives. Pretoria will be capable of "transportation diplomacy" so long as the black states use South African rolling stock, highways, ports, railways, capital, and expertise and need South Africa as a market and as a source of imports.

The dependence of the black states on South African transportation has several facets:

- The use of South Africa's rail lines, ports, and highways. All the black states except Angola, Tanzania, Swaziland, Mozambique, and Lesotho rely heavily on the port of East London for exports and imports. In addition, Durban handles imports for Zimbabwe and Malawi. Dependence on South African highways is greatest for the BLS states (Botswana, Lesotho, and Swaziland) and decreases for the other states the greater their distance from South Africa.

- The use of South African rolling stock, including freight cars, locomotives, trucks, and spare parts (figure 5). SATS freight cars are used by every railroad in the region, except those in Tanzania and Angola. SATS owns approximately 200,000 of the estimated 350,000 freight cars in the region. Locomotives are leased to Botswana, Swaziland, Zaire, Zambia, and Zimbabwe. South Africa's truck fleet is important to Lesotho, Swaziland, Mozambique, Malawi, Botswana, Zambia, and Zimbabwe. South Africa can supply spare parts and equipment to the region cheaper than any overseas supplier.

- The use of South African personnel to help run the transport sector, particularly in Swaziland and Mozambique (especially in Maputo). Zambia's use of South African locomotives also involves South African personnel.

Besides these direct dependencies on the South African transportation system, some black states in the region have other transport links with South Africa, notably:

- Mozambique's dependence on revenues from South Africa's use of the port at Maputo and the rail line from it to Komatipoort. Swaziland will soon benefit similarly from South African goods passing across its borders.

- Dependence on South African capital and expertise for transport development, particularly in Swaziland, Mozambique, and Botswana. South African capital is funding an expansion of the railroad system in Swaziland and some port rehabilitation in Maputo. South African engineers are also being used in road planning in Swaziland and in helping Botswana select a new route to South Africa for coal exports.

- Dependence on South Africa as a source of imports. As of 1980, the BLS states received approximately 90 percent of their imports from South Africa. For nearly all states in the region, South Africa is an important source of agricultural inputs, manufactured goods, and transport equipment.

Figure 4. Pretoria's view of its transportation links.

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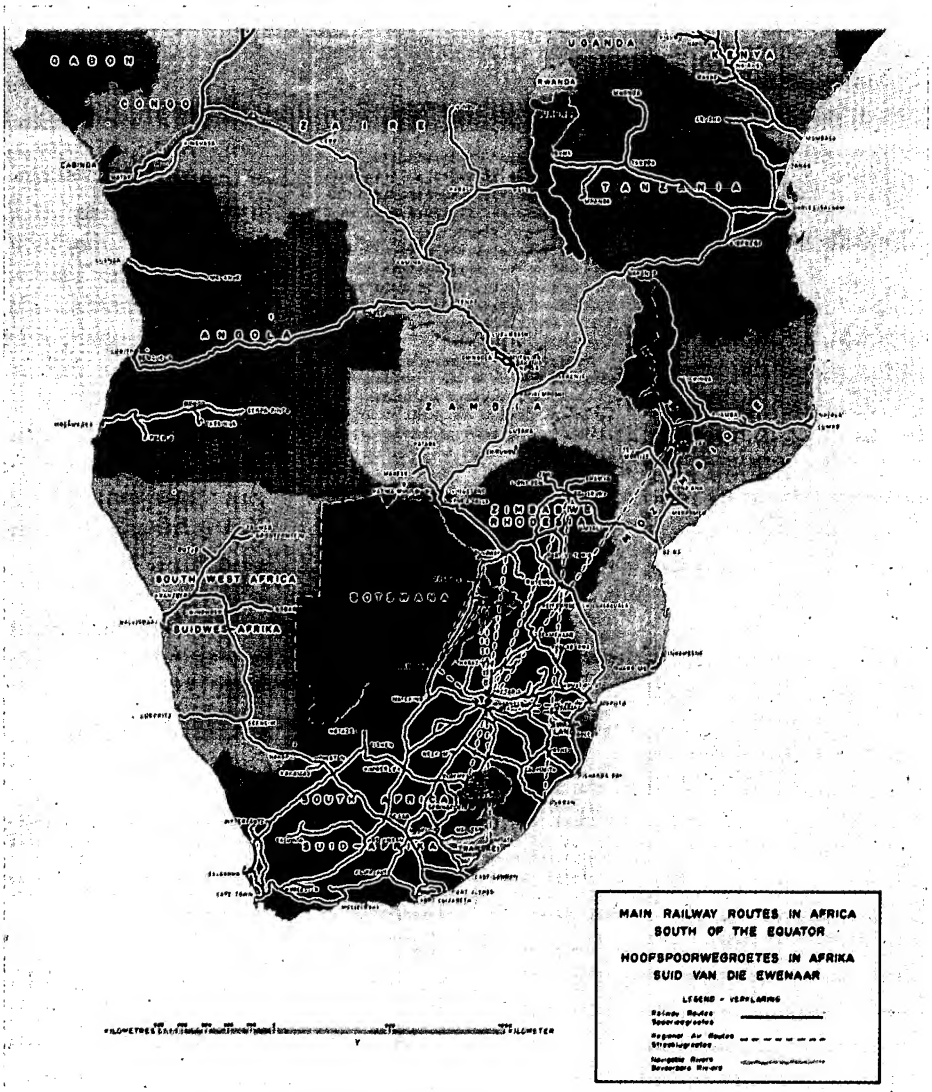

Transport links with neighbours a form of diplomacy

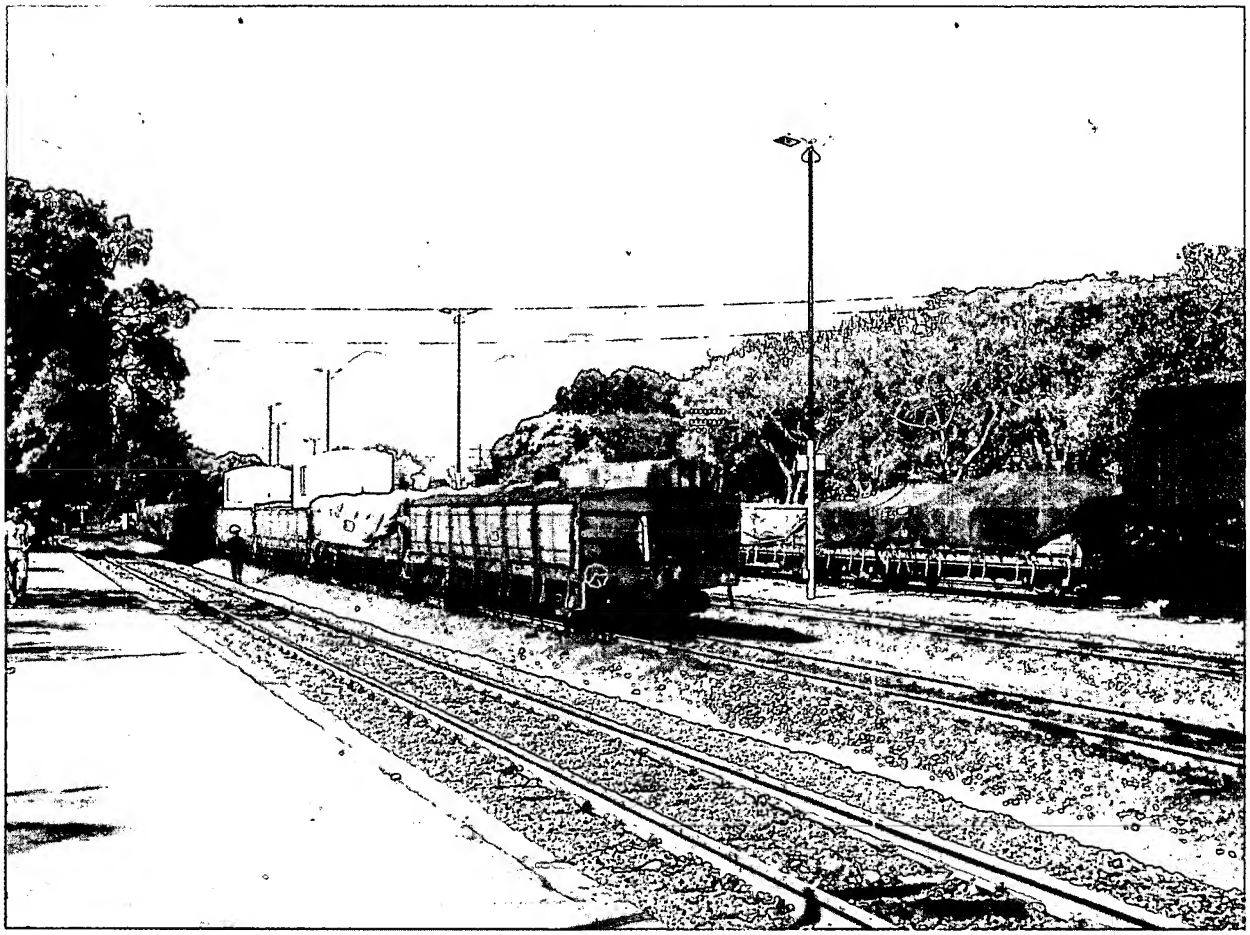

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Figure 5. Goods train bound for Zambia composed of South African freight cars.

South Africa's high density of rail lines largely reflects heavy construction in the late 19th and early 20th centuries resulting from the competition between the British and the Afrikaners for control of the area. This legacy gives South Africa a substantial margin of transportation security. Since there are usually several routing options between major centers, South Africa would suffer less disruption from a given link's closure than any other state in the region.

The seven major ports of South Africa are highly specialized:

- Richards Bay, which was developed in the 1970s for the export of coal, handles more tonnage than any port in Africa. It was developed to relieve the congestion that would have occurred at Durban during a period of rapid expansion of coal exports.
- Durban is South Africa's most important port in terms of the value of exports and imports. Durban handles primarily general cargo in containers.
- East London is the major terminus of the "Southern Route," handling traffic for Zaire, Zimbabwe, Zambia, Botswana, and Malawi.
- Agricultural shipments dominate Port Elizabeth's traffic, particularly grains from Cape Province and the Orange Free State.

- Cape Town also serves the agricultural hinterland but specializes in fruits rather than grains.

- Saldanha, developed in the 1970s for the export of iron ore and the import of petroleum, has proved unprofitable because iron ore exports have been less than expected.

- The port of Walvis Bay, in South Africa's exclave in Namibia, is the base for a major fishing industry and handles Namibian imports and exports.

Facilities for importing crude oil exist at at least three ports (Durban, Richards Bay, and Saldanha), and a major pipeline leads inland from Durban.

Road transport facilities, rolling stock, and tonnages in South Africa dwarf those found in the black states. Within South Africa, private haulers have taken traffic from the rail lines and the port-to-port shipping industry, leading SATS to seek increased regulation of the private sector.

East Coast States

Tanzania and Mozambique are the region's only black states with ports on the Indian Ocean. The former has no direct trade with South Africa, but the latter is in the unique position of handling some South African exports because of its proximity to South Africa's industrial heartland in the Transvaal.

Tanzania's role in the region's transport network involves mainly rail traffic and the use of the port at Dar es Salaam. Two rail lines serve Dar es Salaam: the Tazara and the main line of the Tanzania Railway Corporation (TRC). The Tazara, which was built by the Chinese between 1970 and 1975, serves Zambia primarily, while the main line of the TRC serves western Tanzania, Zaire, and Burundi. Both carry copper exports to the port at Dar. The port has the potential for serving Zambia, Zaire, Burundi, Rwanda, and Malawi, as well as Tanzania, but the facilities there, as in much of the rest of the country, are in an advanced state of deterioration.

Traffic through the port has recently been quite low because of the worldwide recession and Tanzania's own steep economic decline. Consequently, congestion at the port, which was a serious problem in the late 1970s and early 1980s, has eased. Although the recent period of slow demand could have been used to complete much-needed rehabilitation and improvement of the port—developing container- and grain-handling facilities, repaving the area, adding new storage sheds, and providing management training—little has been done. The port and the rail lines serving it could now handle an increase in traffic, but a more-than-25-percent increase probably would lead again to congestion at the port.

Operations on the Tazara have long been below the government's expectations for many reasons, including poor design, poor management, a poorly trained staff, disruptions in 1979 from both Rhodesian bombings and floods, and Chinese-supplied locomotives of insufficient power. Since 1982, many of these problems have been addressed—new locomotives have been purchased, track has been repaired, and the Chinese are helping to run the line—and traffic on the Tazara has increased. Although the Tazara now carries over 70 percent of Zambia's copper exports, and for two months of 1984 the figure was 100 percent, the total tonnage is well below the peak year of 1977 (appendix C).

The main line of the TRC carries copper exports from Zaire. The copper is loaded at Kigoma after crossing Lake Tanganyika by barge. The TRC carries approximately 55,000 tons of copper per year, about one-sixth of the Tazara's present load. TRC officials indicate that the line could carry up to twice its present tonnage if the buildup in traffic were slow.

With one exception, roads in Tanzania are in very poor condition, largely because of lack of maintenance and the nonenforcement of weight limits. The exception is the Tanzam Highway, which now carries just over 75,000 tons of copper per year, down from almost 170,000 tons in 1980. Other commodities shipped on this road include maize, wheat, and fertilizer. The Tanzam Highway roughly parallels the Tazara and the Dar-Ndola oil pipeline, and together they form an important transport corridor from Dar to Zambia. A new road from Karonga in northern Malawi taps into this corridor at Mbeya in southwestern Tanzania.

The development of **Mozambique's** transport facilities is the key to transportation independence from South Africa for Botswana, Malawi, Swaziland, Zaire, Zambia, and Zimbabwe. Mozambican routes are in disarray, however, because of the ongoing insurgency, the lack of skilled labor, the deterioration of the infrastructure, and equipment shortages. Until the security situation improves and massive investment occurs in ports, railways, roads, and the training of personnel, Mozambique will not become a viable alternative to the "Southern Route."

Maputo, the capital, was the busiest port on the east African coast before 1975, with mostly South African traffic. The port area requires some new equipment and rehabilitation but appears to be in fairly good shape and has excess capacity. The port has rail connections with Zimbabwe, Swaziland, and South Africa. Insurgent attacks have closed the Limpopo rail line to Zimbabwe, however, and have limited the use of the rail lines to South Africa and Swaziland to daylight hours only.

Signing the Nkomati accord with South Africa last spring led Maputo to expect more South African traffic and investment at the port, a hope that has been only partially realized. The two countries subsequently signed a transport agreement that, if implemented, could gradually restore Maputo as a major port for the Transvaal. A South African firm has completed an approximately $4 million investment in a new citrus cooling facility at the port.

Insurgent activity has largely closed the port of Beira to rail and road traffic, although refined petroleum products continue to pass through the pipeline to Zimbabwe. The port at Beira used to serve Zambia, Zimbabwe, Malawi, and the coal and sugar areas of central Mozambique. It is plagued by heavy siltation and must undergo frequent dredging.

The northern port of Nacala has the best natural harbor in east Africa, but the insurgency has rendered it, too, inaccessible. Malawi had depended heavily on Nacala but now must route its traffic through South Africa. Attempts to rehabilitate the rail line to Malawi have been thwarted by insurgent attacks.

The insurgency also severely restricts movement within Mozambique. When Malawi tried to ship 50,000 tons of maize to Zimbabwe by road via Tete province last summer, the truck convoy—which had Zimbabwean Army escorts—was attacked by insurgents and three drivers were shot, one fatally, according to the Chief Economic Officer at the US Embassy in Maputo.

West Coast States

The ports of Zaire, Angola, and Namibia are active, but not as important to the region's international trade as those on the east coast.

Copper dominates the land transport pattern of **Zaire** (higher-valued cobalt is shipped by air), using three routes to the sea: the Voie Nationale to Matadi on the Atlantic; the route through eastern Zaire to Lake Tanganyika and onward to Dar es Salaam; and the "Southern Route" to East London. The Benguela railroad, which before 1975 carried most of Zaire's copper, remains closed because of the civil war in Angola.

The Voie Nationale is a rail-river-rail route that runs from the copper belt to Matadi and lies completely within Zaire. Copper is the major export carried, while imports consist of petroleum, manufactured goods, and agricultural products. The Voie Nationale is in need of new locomotives, freight cars, spare parts, track rehabilitation, better management, training of staff, worker discipline, and security against theft.

The ports of Matadi and Kinshasa also need upgrading. The World Bank has supplied funds for rebuilding docks and wharfs at both ports. Better lighting and increased security and fire protection are also planned.

The route to Dar es Salaam separates from the Voie Nationale at Kamina and proceeds to the port of Kalemie on Lake Tanganyika. Copper is then shipped by barge to Kigoma, where it meets the TRC. Approximately 5,000 tons of copper exports per month are shipped to Dar es Salaam via this route.

Kamina, the major internal transshipment point for Zaire, has become a major bottleneck. Freight cars sit on sidings for two or more months because of a lack of locomotives, poor management, and diesel fuel shortages.

Although the "Southern Route" to East London is the longest route to the sea (3,775 kilometers from Lubumbashi), it still provides the most reliable supply of imports and is more efficient than the shorter, alternate routes. It usually carries about 25,000 tons of Zairian imports and 20,000 tons of Zairian copper exports each month. Traffic from the north could be diverted at Bulawayo in Zimbabwe to the Mozambican ports of Beira and Maputo if those routes were open.

Since independence, Zaire's road system has deteriorated badly. Press reports estimate that less than 30 percent of the road system is passable throughout the year largely because of lack of maintenance.

Angola shares many of the same transportation characteristics as Mozambique:

- It once provided a major export route for other states.
- A return to an important role in regional transportation must await the settlement of the country's civil war.
- Its transport infrastructure has badly deteriorated.
- Its personnel are poorly trained.
- Three rail lines run inland from the coast, providing little north-south integration.

The Benguela railroad carried 2.5 million tons of traffic in 1973 but now handles only about one-fifth that figure, nearly all local. The insurgency also has hastened the deterioration of the line. The Benguela was originally built to carry copper exports from the Zairian Copper Belt, although it has also carried Zambian copper.

Once security permits, plans for rehabilitating the Benguela include the acquisition of new freight cars, improved signaling, the development of maintenance facilities, technical training and assistance, and rehabilitation of rails and the railbed.

The ports of Lobito and Luanda also are slated for rehabilitation and expansion of capacity:

- Lobito must develop new wharfs and ore-handling facilities if it is to regain a major role in copper exports once the Benguela railroad opens. A 995-meter wharf that was under construction by the Portuguese at the time of Angolan independence in 1975 has yet to be completed.

- The port of Luanda is congested because it handles most of the government's imports but lacks the necessary equipment for the expeditious handling of container and RO/RO (roll-on/roll-off) vessels. Grain silos for handling needed food imports are also lacking, and manpower training is needed.

South African Transport Services runs the transport system of **Namibia**. South African officials indicate that the rail system runs at a constant loss, in part because it covers long distances and has very high maintenance and construction costs.

The rail network consists of a main line running from South Africa (Namibia's only external rail link) northward to Tsumeb and two east-west spurs. The northern spur runs from Walvis Bay to Gobabis and has been designated as the western section of the proposed Trans-Kalahari Railroad, which we doubt will ever be built (see discussion under Botswana below). In any case, the line between Gobabis and Walvis Bay would need heavier rails and an upgrading of the rail bed to handle tonnages of Botswanan coal large enough to justify the proposed line.

Walvis Bay, which is claimed by and governed as part of South Africa, handles 97 percent of Namibia's overseas traffic. With no breakwaters or natural barriers, the port is exposed, shallow, and unable to handle large coal ships—a requirement of the proposed Trans-Kalahari rail line. Even with these drawbacks, Walvis Bay is better than the less-developed alternatives of Swakopmund and Luderitz, the ports incontestably part of Namibia.

Landlocked States

The landlocked states are particularly affected by bottlenecks and political upheavals in other countries because their economies are heavily dependent on transport facilities in those states. Because many of the landlocked states are transport corridors for other countries, they themselves also can become bottlenecks.

Zambia has used different routes to the sea as political conditions in the region have changed or as bottlenecks in other states have arisen. At present, Zambia uses only two transport corridors for its overseas traffic: the "Southern Route" to East London and the Tazara-Tanzam corridor to Dar es Salaam.

Lusaka's dependence on the "Southern Route" for vital imports has increased Zambia's dependence on South African equipment and personnel. Zambia Railways leased 16 South African locomotives last year to handle traffic from East London. Zimbabwe, Zaire, and Malawi also benefit from Lusaka's access to SATS equipment.

The Tazara carries most of Zambia's copper exports. It is shorter and cheaper than the "Southern Route," and Zambia can pay for its use in kwacha rather than hard currency.

The Tazara could also serve as an alternative carrier of Zaire's copper exports, but this routing has yet to be used. Lusaka may wish to retain the Tazara for itself and thereby to maximize Zaire's use of Zambia Railways.

Road traffic also is important in Zambia. The eastern half of the country has a good system of paved roads, most of which parallel the rail lines and carry primarily agricultural traffic, although the Tanzam Highway also carries copper exports. Zambia has good road connections with Botswana, Zimbabwe, and the Zairian Copper Belt, but road connections to Angola and Namibia are incapable of carrying heavy traffic and are passable only during the dry season from May to August.

Malawi historically has been primarily dependent on the transport facilities in Mozambique, but the effective closure of the Mozambican ports of Beira and Nacala has forced Lilongwe to use Zambia's Great East Road to tap into the "Southern Route" to South Africa. This multimodal route is long, expensive, and leads to unprofitable exports and more expensive imports.

Malawi has tried with little success to diversify its transportation links. The greatest volume of international freight is still carried by truck from Lilongwe to Lusaka and then by rail to East London or Durban, but this route is hampered by the inconsistent performance of Zambia Railways and poor transshipment facilities and transport management in Lusaka. The road route from Blantyre across Mozambique to Harare, in combination with a rail connection from Harare to Beira, would be much shorter and cheaper, but most shippers avoid this route because of security hazards. A circuitous but generally reliable route for the import of fuel and general merchandise involves rail shipment from Durban to Harare followed by road delivery through Lusaka to Lilongwe. A shorter but more dangerous variation uses the same rail connection followed by road access across Mozambique to Blantyre.

Malawi probably can now ship some goods through Tanzania to Dar es Salaam because a new, temporary road from Mbeya, Tanzania, southward to the Malawian lake port of Karonga was officially opened in early December, giving Malawi access to the Tazara Railroad, the Tanzam Highway, and the Dar-Ndola pipeline. The US Embassy in Lilongwe is skeptical, however, that this new link will pick up much of the slack because of the poor condition of the temporary road, poor transshipment facilities at Mbeya, and deteriorated conditions at Dar es Salaam.

Zimbabwe's economic dependence on South Africa reflects its proximity as a landlocked state and the legacy of relations between Pretoria and the preindependence white regime in Salisbury. For example, several South African firms have major investments in Zimbabwe.

Zimbabwe's transportation dependence on South Africa is even more pronounced because the Mozambican transport corridors to Beira and Maputo have

been disrupted by insurgency. As a result, nearly 90 percent of Zimbabwe's exports go to or through South Africa. For the 12-month period ending 30 June 1983, the connections from Zimbabwe to South Africa via Beitbridge and Botswana handled 83 percent of port-bound trains, according to statistics published by the National Railways of Zimbabwe. Even traffic bound for Maputo must now pass through South Africa.

Zimbabwe has the best transport infrastructure of all the black-ruled states in the region, and it has maintained and even upgraded these facilities since independence. Skilled white personnel who left the rail lines have been replaced by Indian and Pakistani expatriate workers brought in under a World Bank program. The National Railways of Zimbabwe has also purchased new locomotives and is much less dependent on South African engines. These changes, coupled with the recent economic recession and drought have led to excess capacity in both the rail and road sectors, but a large corn harvest could tax the system.

The transportation network in **Botswana** is concentrated in the eastern part of the country, with rail and road connections to South Africa and Zimbabwe and the Botzam Highway from Francistown to the Zambian border. The government of Botswana would like to upgrade the entire rail line but lacks sufficient funds. The Chinese are upgrading the railbed from Gaborone to the South African border.

Gaborone plans to take over ownership of the rail line in Botswana, which is owned and operated by the National Railways of Zimbabwe. Although the takeover was originally scheduled for this year, economic woes have delayed it until 1987. Motivated by national pride rather than economics, Botswana lacks the labor force to run the operation on its own and will, in our view, have to depend on expatriates for training and management.

Gaborone also is considering a new rail link with South Africa. This line, which will carry coal exports, will most likely connect with the South African system at Ellisras. SATS aided Botswana in choosing this alternative.

We doubt that the Trans-Kalahari rail link with Namibia, which has been proposed for the export of Botswanan coal, will ever be built. It would be very costly to construct and maintain; alternatives exist (particularly through South Africa); and the demand for Botswanan coal is uncertain because its high water content limits its commercial appeal.

The Botzam Highway, which was recently paved with US assistance, leads to a bottleneck at Kazungula on the Zambezi River. There is no bridge over the river, so trucks and other vehicles must be ferried across. Construction of a bridge that would alleviate the bottleneck must await determination of the exact meeting point of the borders of Botswana, Zambia, Zimbabwe, and Namibia at the river crossing.

Because of its location, **Lesotho** must ship all its goods through South Africa. The major roads lie in the western half of the country and lead to industrial areas in South Africa. Most roads within Lesotho are gravel.

Several projects are under way to upgrade roads. The most important is the Southern Perimeter Road, which would allow travel from the western part of the country to the east without passing through the Transkei—the former South African homeland whose "independence" is recognized only by Pretoria.

A 1.2-kilometer rail line, which is owned and operated by SATS, runs from the border with South Africa to Maseru. The government of Lesotho hopes to develop a container terminal at Maseru to handle containers brought in by rail.

Swaziland Railways is managed by South African personnel supplied by SATS. The original rail line in Swaziland was used for the export of iron ore and ran from the mines in the western part of the country to Mozambique. Because the iron ore has been depleted, the line carries mainly agricultural products.

Swaziland is developing a north-south rail line that will connect with the South African rail system at each end. The southern portion of the line runs from central Swaziland to the border town of Golela and was built in the late 1970s. The northern portion is being constructed with SATS aid and, upon completion, will connect with the South African town of Komatipoort near the Mozambican border. Designed to carry South African phosphates as well as some Swazi agricultural products to Richard's Bay, the line also will give Pretoria new leverage when dealing with Mozambique. Should relations between Maputo and Pretoria become strained, South Africa could divert goods destined for Maputo to Richard's Bay or other South African ports.

Swaziland's external road traffic is dominated by imports from and exports to South Africa, with the major traffic generators being tourism, timber, lumber, and sugar. Although there is a dense road network in Swaziland, most roads are unpaved. South African capital and expertise would probably be needed if Mbabane is to expand its paved road network substantially.

The Feasibility of a System Independent of South Africa

The Southern African Development Coordination Conference (SADCC) was formed by nine black states in 1980 to promote the economic development of its members and to overcome their transportation dependence on South Africa. The SADCC states aim to cut their use of the South African transport system by 90 percent by the year 2000.

An independent transportation system for the black-ruled states would be a prerequisite for effective economic sanctions against South Africa. Without such a system, in our judgment, most sanctions imposed against South Africa would hurt the black states more than Pretoria.

The most important transport corridors for an independent system would be those that lead to Lobito on the west coast and to Dar es Salaam, Nacala, Beira, and Maputo on the east coast. These ports and the transport corridors leading to them have the potential for handling most of the traffic of Zaire, Zambia, Malawi, Zimbabwe, and Botswana—countries that depend on South Africa for access to the sea.

The development of these transport corridors—rehabilitating routes and ports, purchasing equipment, and training personnel—must await the ending of the civil wars in Angola and Mozambique and massive financial and technical aid. Thus far, however, the SADCC has had only limited success in securing pledges, having obtained:

- Six percent of required funding for rehabilitating Dar es Salaam and the corridors serving it.
- Eighteen percent of the funds to rehabilitate the port of Beira and the rail and road lines serving it.
- Twenty percent and 22 percent of the funds required for Lobito and Maputo, respectively (see appendix D).

Most of these funds were pledged before 1981. The transportation systems of the black states, except Zimbabwe, probably are deteriorating faster than funds for their rehabilitation and improvement have been acquired.

The projects targeted by the SADCC's Transport and Communications Commission (SATCC) nevertheless address many of the transport problems facing the black states:

- Poor maintenance of rail, road, and port facilities. The approach of many countries seems to be "use it till it breaks." Preventive maintenance in many states is almost nonexistent.

- Shortage of spare parts, largely owing to lack of foresight, poor management, and lack of foreign exchange.

- Absence of up-to-date, functioning equipment for railway signaling, communications, locomotives, freight cars, container-handling facilities at ports, and storage facilities. The shortage of railway rolling stock in particular has increased direct dependence on South Africa.

- Lack of skilled labor. Training programs and facilities are desperately needed in several countries because the colonial powers generally failed to train the local labor force to take over skilled positions; skilled personnel usually left after independence; and transport systems were often turned over to the local labor force after minimal training.

Overcoming unreliability and inefficiency is perhaps the most difficult of these tasks because it requires the development of a skilled, disciplined labor force. While equipment can be purchased and delivered relatively quickly, the education of the labor force takes far longer.

Prospects

We believe the SADCC's stated aim of cutting its transportation dependence on South Africa by 90 percent by the year 2000 is unrealistic and incompatible with SADCC's goal of economic development. If the black states are to prosper economically, they probably cannot escape dependence on South African transport facilities and on South Africa more generally as a market for their goods and as a source of supply for expertise, training, technology, and manufactured goods for their economic development.

The development of an alternative transportation system for the black states would require a revolutionary change in the region's trading patterns—one that is almost certainly beyond the capabilities of the black states either individually or collectively:

- South Africa is the major trading partner for several of the SADCC states, particularly for the imports of Botswana, Lesotho, Swaziland, Zimbabwe, and Malawi.
- Mozambique, Zaire, and Zambia also do business with South Africa.

We see little prospect for fundamental change in these trading patterns because most of the black states would be unwilling to forgo the economic benefits of trading with South Africa. We believe, therefore, that for most black states transportation dependence on South Africa will continue well into the next century.

While the members of SADCC express allegiance to the goals of economic development and transport independence from South Africa, for most—if not all—it is the former that takes precedence. As we have noted:

- Botswana is considering a new rail link to South Africa.
- Swaziland is constructing a new rail link to South Africa.
- Mozambique is actively courting South African traffic and investment.
- Botswana, Swaziland, Zambia, and Zimbabwe rely on South African locomotives; so does Zaire, which is not a member of SADCC.
- Zimbabwe and the BLS states would suffer catastrophic economic losses if they broke transport and trade ties with South Africa, and it would be against the economic interests of Mozambique and, in varying degrees, several of the other black states to do so.

The most likely prospect, therefore, is for the eventual rehabilitation of transport links within several states, though not as soon or as many as the SADCC plans, and for the easier movement of goods between member states. For states north of the Zambezi River, this could lead to less dependence on the South African transport system. For those that border on South Africa, even reducing transport ties will remain difficult for years.

Indeed, SADCC projects may lead to increased trade with South Africa. For example, Pretoria originally opposed the Botzam Highway, believing it might reduce South Africa's influence in Botswana, but the road instead has increased trade between South Africa and Zambia, and Botswana is no less dependent on South Africa.

The southern African transportation network does not require major new links. Existing rail and road options have been sufficient for users to adapt to the disruptions the region has experienced over the past two decades. Even with several ports now inaccessible, the functioning ports, highways,and railways—with the exception of Zambia Railways—have excess capacity.

The transport network has enough capacity to handle even the most optimistic traffic projections through the year 2000, assuming adequate maintenance and no further major disruptions of existing facilities. The only possible exceptions may be handling of corn for export at harvesttime and port capacities for handling coal. South Africa has substantially increased its coal-handling facilities during the past decade, and it is about to embark on a major investment program for better handling of corn exports.

Barring civil war in South Africa or a general regional conflagration, the South African transportation system is likely to remain the most developed, efficient, and reliable in southern Africa. Given the problems on alternate routes, its strengths are likely to perpetuate the present pattern of strong north-south and weak east-west trade and transport flows, at least until there is stability in Mozambique and Angola. If alternative transport routes are developed, South Africa would probably continue to be a market for the exports of the black states, a source of their imports, and an important supplier of rolling stock.

Moreover, even if the civil wars in Mozambique and Angola come to an end, opening up alternative east-west routes that are now largely closed to the black states, we believe that South Africa will maintain considerable leverage over the transport and more general economic options available to the black states. The degree of dependence may decrease, but we believe some measure of dependence will continue, as now, in inverse proportion to their distance from South Africa.

Implications for the United States

In our judgment, the virtual stranglehold that Pretoria has over the transportation network in southern Africa limits both the choices available to the black states and US policy options for promoting peaceful change and stability in the region. Western assistance for the development of alternative transportation routes for the black states will not alter their dependence on South Africa as a source of imports, a market for exports, and a supplier of rolling stock. US and other donor support for SADCC transportation projects would, however, help the black states directly by aiding their development and indirectly foster increased SADCC trade with South Africa and greater economic interdependence between Pretoria and the black states.

In our view, any country that supports the SADCC has to recognize that the organization's basic goals—economic development and independence from South Africa—are incompatible and that transportation independence from South Africa will probably never be achieved. We believe that support for SADCC promotes interdependence more than SADCC's purported goal of independence and that it contributes to greater stability and peaceful change in southern Africa.

Opportunities for US participation in near-term regional transport projects probably will be greatest in interior rather than coastal states. Three of the four major east-west corridors (those to Lobito, Nacala, and Beira) pass through areas of insurgency while the fourth (to Dar es Salaam) is in a country that has squandered foreign aid to the point that the United States cannot, by law, provide further assistance.

Opportunities for US trade, aid, and investment in the southern African transportation network seem best in the provision of spare parts and new equipment. Such needs are strong in all modes of surface transportation and in all of the states in the region except South Africa. Because much of US trade with Africa from the Zairian Copper Belt south passes through South Africa, maintaining this access probably will be necessary if the United States is to continue to do business with and to provide assistance to most states in the region.

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Appendix A

Ports and Route Choices (by Country)

	Ports	Transport Corridor	Foreign Countries Through Which Goods Must Pass	Status	Comments
Angola (excluding Cabinda)	Lobito	Local highway and Benguela railroad		Serving only local traffic.	Routes are subject to disruption. The government does not control eastern half of country, nor much of the south.
	Luanda	Local rail and highway		Major port for imports; congested.	
	Namibe	Local rail and highway		Serving only local traffic.	
Botswana	East London	South Africa	South Africa	Functioning.	New rail link to South Africa at Ellisras is planned. Trans-Kalahari rail line unlikely to prove feasible.
Lesotho	Little overseas trade	South Africa	South Africa		
Malawi	Beira	Rail and road	Mozambique	Nonfunctional.	
	Dar es Salaam	Road and rail	Tanzania	Opened in December.	A new, temporary road makes Dar es Salaam accessible for limited quantities.
	East London or Durban	Road to Lusaka, then "Southern Route"	Zambia, Zimbabwe, Botswana, and South Africa	Main route available.	
	Nacala	Rail and road	Mozambique	Nonfunctional.	
Mozambique	Beira	CFM (Mozambican Railways) Central line		Serving mostly local traffic.	All transport lines are subject to disruption.
	Maputo	CFM South line		Serves local and international traffic.	
	Nacala	CFM North line		Serving only local traffic.	
Namibia	Walvis Bay	Local rail and road	See comment	Handles 97 percent of Namibian port traffic; a shallow, exposed port; run by SATS.	Rail connection is with South Africa. Walvis Bay is claimed by and governed as part of South Africa.

Ports and Route Choices (by Country) (continued)

	Ports	Transport Corridor	Foreign Countries Through Which Goods Must Pass	Status	Comments
South Africa	Cape Town			Serves agricultural hinterland; major container cooling facilities.	All ports served by road and rail.
	Durban			Most important in South Africa.	Agricultural goods, particularly sugar, are also handled.
	East London			Terminus of the "Southern Route": important handler of copper exports and imports for black states.	
	Maputo	Ressano Garcia Line (rail line from Komatipoort to Maputo)	Mozambique	Handles ores and fruits. Trains run only during daylight hours to avoid insurgents.	
	Port Elizabeth			Major grain-exporting port.	
	Richards Bay			Major coal-exporting port.	
	Saldanha Bay			Used for exporting iron ore and importing oil.	
Swaziland	Maputo	Goba Line (rail line from Swazi border to Maputo)	Mozambique	Trains run only during daylight hours to avoid insurgent attacks. Line needs maintenance.	New north-south line will make South African ports accessible.
Tanzania	Dar es Salaam	TRC, Tazara, and Tanzam Highway		Major port; has excess capacity; in need of rehabilitation.	The road system in Tanzania is in very bad shape; much of the country is difficult to reach.
	Mtwara	Local road		Serves local needs; could serve Malawi some day.	
	Tanga	TRC and road		Secondary port; handles agricultural goods.	

Ports and Route Choices (by Country) (continued)

	Ports	Transport Corridor	Foreign Countries Through Which Goods Must Pass	Status	Comments
Zaire	Dar es Salaam	Rail to Lake Tanganyika, barge to Kigoma, rail (TRC) to Dar	Tanzania	Functioning.	5,000 tons of copper per month.
	East London	"Southern Route"	Zambia, Zimbabwe, Botswana, and South Africa	Major route for exports and imports.	20,000 tons of copper exports per month, 25,000 tons of imports. Traffic on the "Southern Route" could be routed from Bulawayo to Mozambican ports.
	Lobito	Benguela	Angola	Nonfunctioning.	Shortest route to sea from Lubumbashi.
	Matadi	Voie Nationale		Functioning.	
Zambia	Dar es Salaam	Tazara and Tanzam Highway	Tanzania	Tazara is now the primary route for copper exports.	Zambia has the potential to develop routes, some multimodal, to Nacala and Beira.
	East London	"Southern Route"	Zimbabwe, Botswana, and South Africa	Primary route for imports, some exports; traction in Zambia a problem.	"Southern Route" traffic could be diverted at Bulawayo to Mozambican ports.
Zimbabwe	Beira	Rail, road, and pipeline	Mozambique	Rail and road traffic is generally disrupted.	
	Maputo	Rail via Limpopo Line or Beitbridge	Mozambique or South Africa and Mozambique	Limpopo Line is nonfunctional.	
	East London	"Southern Route"	Botswana, South Africa	Major route used. National Railways of Zimbabwe to turn over ownership of Botswana rail line to Gaborone in 1987.	Durban is sometimes used.

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Appendix B

Trade Relations With South Africa

Trade relations between the black states and South Africa are an important form of interdependence but are difficult to measure. South Africa does not publish statistics for its exports to individual African countries because it knows this would embarrass them and hinder future trade. The most plausible estimates of South African trade with the SADCC states that we have found in the unclassified literature appear in the table.

G. M. E. Leistner, the Director of the Africa Institute of South Africa, has suggested that trade figures for some countries may actually be twice the reported figures. The import figures in the table for several countries—particularly Mozambique, Zambia, and Zimbabwe—are almost certainly too low. Countries often buy South African goods from third parties, which also distorts the figures.

Table 1 *Percent*
South African Trade

	Exports to South Africa (1980)	Imports From South Africa (1980) [a]
Botswana	8	88
Lesotho	95	90
Mozambique	5	15
Zambia	NEGL	7
Zimbabwe	20	40
Malawi	4	40
Swaziland	20	90
Tanzania	NEGL	NEGL
Angola	NEGL	NEGL

[a] Roger Leys and Arne Tostensen, "Regional Cooperation in Southern Africa: The Southern African Coordination Conference," *The Review of African Political Economy*, vol. 27, 1982, pp. 52-71.

By contrast, according to official South African statistics for 1981, 11 percent (by value) of South African exports were to the rest of Africa, and only 2 percent of its imports were from the rest of Africa. For certain commodities and sectors of the economy, however, African nations are an important market for South Africa. According to Leistner,[2] in 1979 the following proportion of key South African exports went to other African countries:

- Fifty-seven percent of exported machinery.
- Fifty-four percent of South African exports of plastics and rubber.
- Forty-eight percent of all exports of stone and glassware.
- Thirty-five percent of transport and related equipment.

If the SADCC's drive for efficiency in transport is successful, it should make markets for these products more accessible and may increase trade between Pretoria and the black states.

[2] G. M. E. Leistner, "Economic Relations Among Southern African States," *Geojournal*, Supplementary Issue 2, 1981, pp. 85-93.

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Appendix C

Zambian Copper Shipments

Zambia has used Dar es Salaam and East London as the major exporting ports for its copper since 1976. The following data obtained from the World Bank indicate the relative importance of each route.

For each route, we have the following comparisons in US dollars per metric tons:

Distance (km)	2,200	2,050	3,250
Days to Port	11	19	24
Cost to Port	101	97	148

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Table 2 *Thousand metric tons*
Zambian Copper Shipments

	To Dar es Salaam		To East London
	Via Tanzam Highway	Via Tazara Railroad	Via the "Southern Route"
1976	291	190	
1977	154	395	
1978	113	389	58
1979	140	148	261
1980	169	237	178
1981	109	270	148
1982	80	295	137
1983	78	340	137

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Appendix D

Financial Progress of the SATCC

The Southern Africa Transportation and Communications Commission (SATCC) published the following cost estimates for its various transport projects in a 1984 report. Because delays in implementing programs will increase costs, the estimated cost figures may be too low.

According to the SATCC, the status of projects in key sectors was:

	Estimated Costs (*Million US $*)	Additional Foreign Capital Needed	Percent Pledged	Percent Under Discussion	Percent Remaining
Operational coordination and training	12.2		39	36	25
Roads	826	621	20	15	65
Railways	978	827	24	18	58
Ports and water transport	661	494	10	10	80
Civil aviation	100	80	52	16	32
Telecommunications	277	236	56	26	18

Clearly, the need for money is greatest in the roads, railways, and ports. These tend to be capital intensive projects most crucial to the future trade of the region.

According to the SATCC, the status of projects by area was:

	Estimated Costs (*Million US $*)	Additional Foreign Capital Needed	Percent Pledged	Percent Under Discussion	Percent Remaining
Maputo Port System	716	571	22	10	68
Beira Port System	524	419	18	8	74
Nacala Port System	238	185	43	8	49
Dar es Salaam Port System	411	301	6	43	51
Lobito Port System	168	163	20		80

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Figure 6
Southern Africa's Transportation Network

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